

REMARKS

Claims 1-8, 16-24 and 32-35 have been rejected. Applicant has amended claims 1, 18 and 34; and claims 1-8, 16-24 and 32-35 remain in the application. Reexamination and reconsideration of the application are requested.

Applicant appreciates the Examiner's suggested language to properly identify the relationships of the cases and has amended the application to substantially incorporate the suggested language.

Claims 1-8, 16, 17 and 34 stand rejected under 35 U.S.C. § 103 (a) as being unpatentable over Bowen et al. in view of Orme et al., Alvarez et al. and Garner et al..

Applicant believes it again appropriate to set forth the requirements for rejections based on 35 U.S.C. § 103. The initial burden is on the Examiner to establish a case of *prima facie* obviousness. In order to do this by combining references, the prior art must provide some reason or motivation to make the claimed compositions, *In re Dillon*, 16 U.S.P.Q.2d 1897, 1901 (Fed. Cir. 1990) (en banc). As more recently and aptly stated in *In re Jones*, 21 U.S.P.Q.2d 1941, 1943-44 (Fed. Cir. 1992) (emphasis in original):

Before the PTO may combine the disclosure of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . . Conspicuously missing from this record is any *evidence*, other than the PTO's speculation (if it be called evidence) that one of ordinary skill in the . . . art would have been motivated to make the modifications of the prior art necessary to arrive at the claimed [invention].

When making a rejection under 35 U.S.C. § 103 there are three fundamental areas the Examiner is required, under 37 C.F.R. § 1.106 and MPEP § 706.02, to cover. First, the rejection should set forth the differences between the claims and the prior art. Second, the proposed modification of the applied references necessary to arrive at the claimed subject matter should be set out. Third, there must be an

explanation why such proposed modifications would be obvious. With the above background in mind the rejections under 35 U.S.C. § 103 will be discussed.

The Examiner's basis for the proposed combination of Bowen et al., Orme et al., Alvarez et al and Garner et al. is as follows:

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the system of Bowen et al. (-043) with the nozzle of Alvarez et al. (-853) because the nozzle of Alvarez et al. (-853) would provide an alternative configuration for forming a spray of directed droplets and because such a modification would provide a spray of substantially uniform droplet size and thus overcome the deficiency in spray forming of wide droplet size distribution as recited by Orme et al. (-360), and to modify the article to be a mold because a mold is an article that can be made by spray forming as disclosed by Garner et al. (-152).

Applicant respectfully asserts that the Examiner has not established a *prima facie* case of obvious because there is no suggestion for the proposed combination. For example, the Examiner states that the system of Bowen et al. should be combined with the nozzle of Alvarez et al. "because the nozzle of Alvarez et al. (-853) would provide an alternative configuration for forming a spray of directed droplets" (emphasis added). Applicant respectfully asserts that "providing an alternative configuration" does not provide any explanation of why such proposed modification would be obvious to one skilled in the art. Rather, the explanation appears to be a hindsight reconstruction of the of the claimed invention.

The Examiner further states the that Bowen et al. should be combined with Alvarez et al. "...because such a modification would provide a spray of substantially uniform droplet size and thus overcome the deficiency in spray forming of wide droplet size distribution as recited by Orme et al.".

Providing a uniform droplet size is an advantage of the present invention, and it was stated by Orme et al. to be a disadvantage of spray forming. Therefore, Orme et al. actually teaches away from

the proposed combination of since the disclosure of Orme et al. does not believe the uniform droplet size to be achievable using spray forming technologies. Not only does Orme et al. suggest away from the proposed combination of reference, but it actually demonstrates a secondary consideration for the nonobviousness of the present invention (i.e., that spray forming technologies cannot be operated in a controlled environment).

Dr. McHugh, the inventor of the present invention, has indicated in the attached second Declaration in this matter, that one skilled in the art would not be motivated to combine Bowen et al. with Alvarez et al. since the Bowen et al. invention desires to maintain a low chamber pressure because "such low spray chamber gas partial pressure provides a higher temperature of atomized spray in flight". This is directly opposite to the present invention of claim cooling the atomized droplets within the chamber by a quench gas.

Dr. McHugh further states that the proposed modification of the Bowen et al. invention would actually render the system of Bowen et al. undesirably inoperable since it would not achieve the desired results of a reduction of the deposit porosity, reduce grain layering or banding, or provide uniform grain structure through the thickness. Bowen et al. teaches that these desired results are achieved by providing higher temperature of the atomized spray, rather than a rapid cooling of the atomized droplets as claimed in the subject application.

Dr. McHugh also notes that the Orme et al reference identifies that spray forming technologies are for the most part uncontrolled and thus smaller droplets may arrive at the surface pre-solidified. Therefore, Dr. McHugh notes one skilled in the art would not be motivated by Orme et al. to provide the controlled cooling of atomized droplets as claimed in the subject invention, especially since it is actually desired in the present invention to have pre-solidified droplets.

For the foregoing reasons, it is respectfully asserted that the Examiner has not established a *prima facie* case of obviousness and it is requested that this ground for rejection be withdrawn and the claims found in a condition of allowance.

Claims 18-24, 32 and 33 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over Bowen et al. in view of Orme et al., Alvarez et al. and Garner et al.. as applied to claims 1-8, 16, 17 and 34 and further in view of Ashok et al. Applicant respectfully asserts that, for the reasons previously set forth, no *prima facie* case of obviousness has been made and Applicant further requests that this rejection be withdrawn for the reasons stated above.

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bowen et al. in view of Orme et al. Alvarez et al, and Garner et al. as applied to claims 1-8, 16, 17 and 34 above, and further in view of Rotolico et al.. Again, Applicant respectfully asserts that, for the reasons previously set forth, no *prima facie* case of obviousness has been made and Applicant further requests that this rejection be withdrawn for the reasons stated above.

Minor editorial amendments have been made to claims 1, 18 and 34 to better describe the invention. No new matter has been added.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached pages are captioned **“Version with markings to show changes made”**.

In view of the above amendment and remarks, Applicants believe this application should be considered ready for allowance and Applicants earnestly solicit an early notice of the same. Should the Examiner be of the opinion that a telephone conference would expedite prosecution of the subject application, please call the undersigned at the below-listed number.

RESPECTFULLY SUBMITTED,

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UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)
)
 Kevin M. McHugh)
)
 Serial No. 09/592,003) Examiner: Leyson
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 Filed 06/12/00) Group Art Unit: 1722
)
 Atty. Dkt.: EGG-PI-612A1a)
)
 For: Rapid Solidification)
 Processing System for)
 Producing Molds, Dies and)
 Related Toolings)
 _____)

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The following paragraphs have been amended as follows: Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

The paragraph beginning on page 1, lines 4-6:

This is a continuation-in-part of United States application S/N 09/023,037 filed February 12, 1998, now U.S. United States Patent No. _____ which is hereby incorporated by reference 6,074,194, which is a continuation of United States. application No. 08/322,032, filed October 7, 1994, now United States Patent No. 5,718,863, which is a continuation-in-part of 07/983,459, filed on November 30, 1992, now abandoned, all hereby incorporated by reference.

In the claims:

The claims have been amended as follows: Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

1. (Twice Amended) A system for the spray forming manufacture of near net shape molds,

dies and related toolings, comprising:

a nozzle having a flow channel, said flow channel having an inlet end, an outlet end and a longitudinal axis;

a liquid reservoir in fluid communication with said nozzle flow channel, said reservoir adapted to contain a liquid material capable of forming a mold, said liquid being pressurized in a pressurized reservoir and injected from said reservoir through a conduit ending in said nozzle flow channel between said inlet and outlet ends and proximate to said nozzle longitudinal axis;

means for flowing a high temperature atomizing gas at a flow velocity ranging from high subsonic through supersonic velocities through the nozzle flow channel from the inlet end to the outlet end to atomize the liquid injected into the flow channel into a plume of atomized droplets;

a chamber containing adapted to contain a quench gas, ~~said quench gas~~ having a controlled temperature and composition for controlling the in-flight cooling of the atomized droplets;

means for directing and depositing the cooled atomized droplets onto a pattern to form the mold.

18. (Twice Amended) A system for the spray forming manufacture of near net shape molds,

dies and related toolings, comprising:

a plurality of nozzles, each nozzle having a flow channel, each of said flow channels having an inlet end, an outlet end and a longitudinal axis;

a liquid reservoir in fluid communication with each of said nozzle flow channels, said reservoir adapted to contain a liquid material capable of forming a mold, said liquid being pressurized in a pressurized reservoir and injected from said reservoir through a conduit ending in said nozzle flow channel between said inlet and outlet ends and proximate to said nozzle longitudinal axis;

a high temperature atomizing gas at a flow velocity ranging from high subsonic through supersonic velocities through each of the nozzle flow channels from the inlet end to the outlet end to atomize the liquid injected into the flow channels into a plume of atomized droplets directed to a chamber **containing adapted to contain** a quench gas, ~~said quench gas~~ having a controlled temperature and composition for controlling the in-flight cooling of the atomized droplets;

means for directing and depositing the cooled atomized droplets onto a pattern to form the mold.

34. (Twice Amended) A system for the spray forming manufacture of near net shape molds, dies and related toolings, comprising:

a nozzle having a flow channel, said flow channel having an inlet end, an outlet end, and a longitudinal axis;

a plurality of reservoirs in separate fluid communication with said nozzle flow channel, at least one of said reservoirs adapted to contain under pressure a liquid material capable of forming a mold and injected from said reservoir through a conduit ending in said nozzle flow channel between said

inlet and outlet ends and proximate to said nozzle longitudinal axis;

means for flowing a high temperature atomizing gas at a flow velocity ranging from high

subsonic through supersonic velocities through the nozzle flow channel from the inlet end to the outlet end to atomize the liquid injected into the flow channel into a plume of atomized droplets directed to a chamber **containing adapted to contain** a quench gas, **said quench gas** having a controlled temperature and composition for controlling the in-flight cooling of the atomized droplets;

means for directing and depositing the cooled atomized droplets onto a pattern to form the mold.